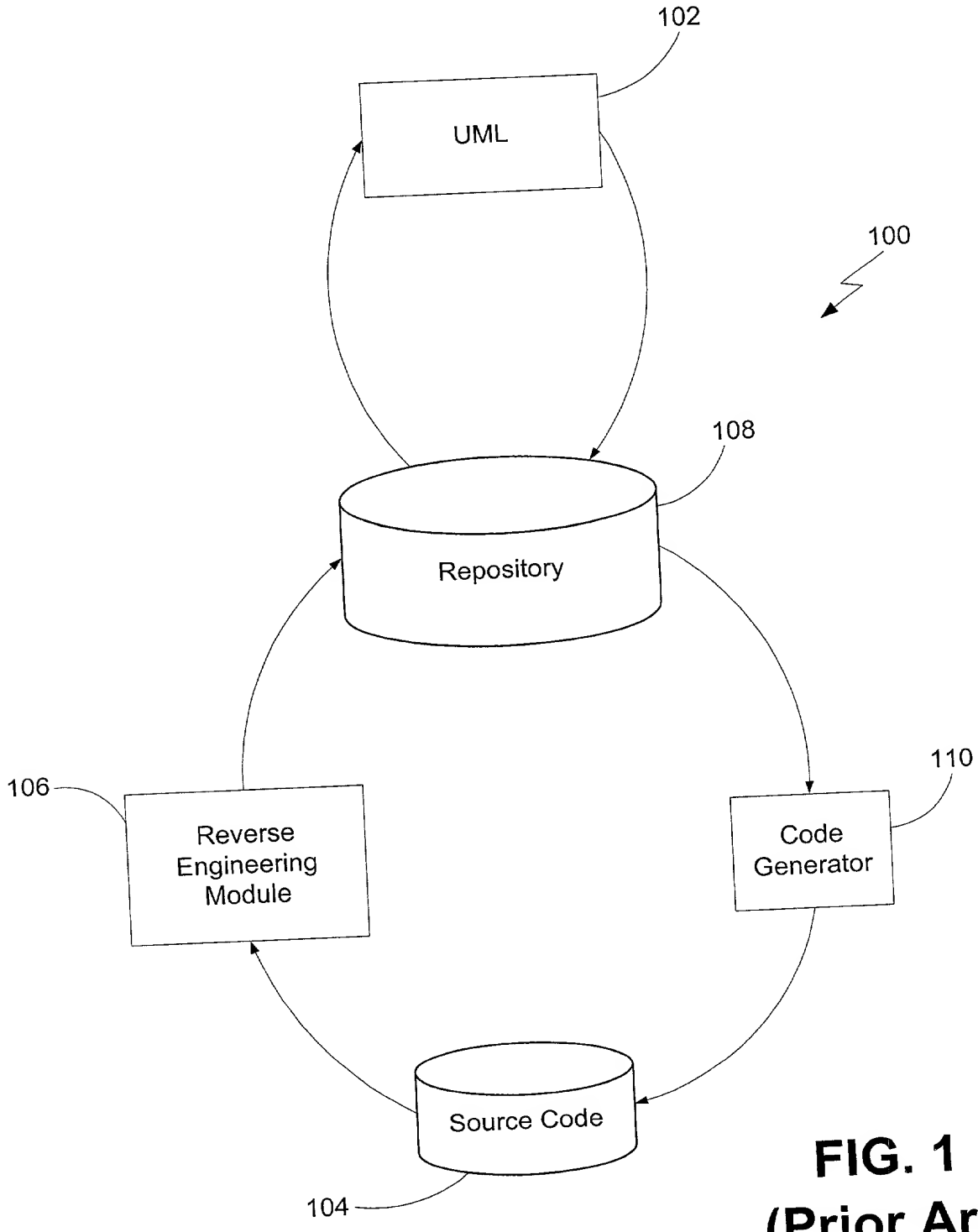

FIG. 1
(Prior Art)

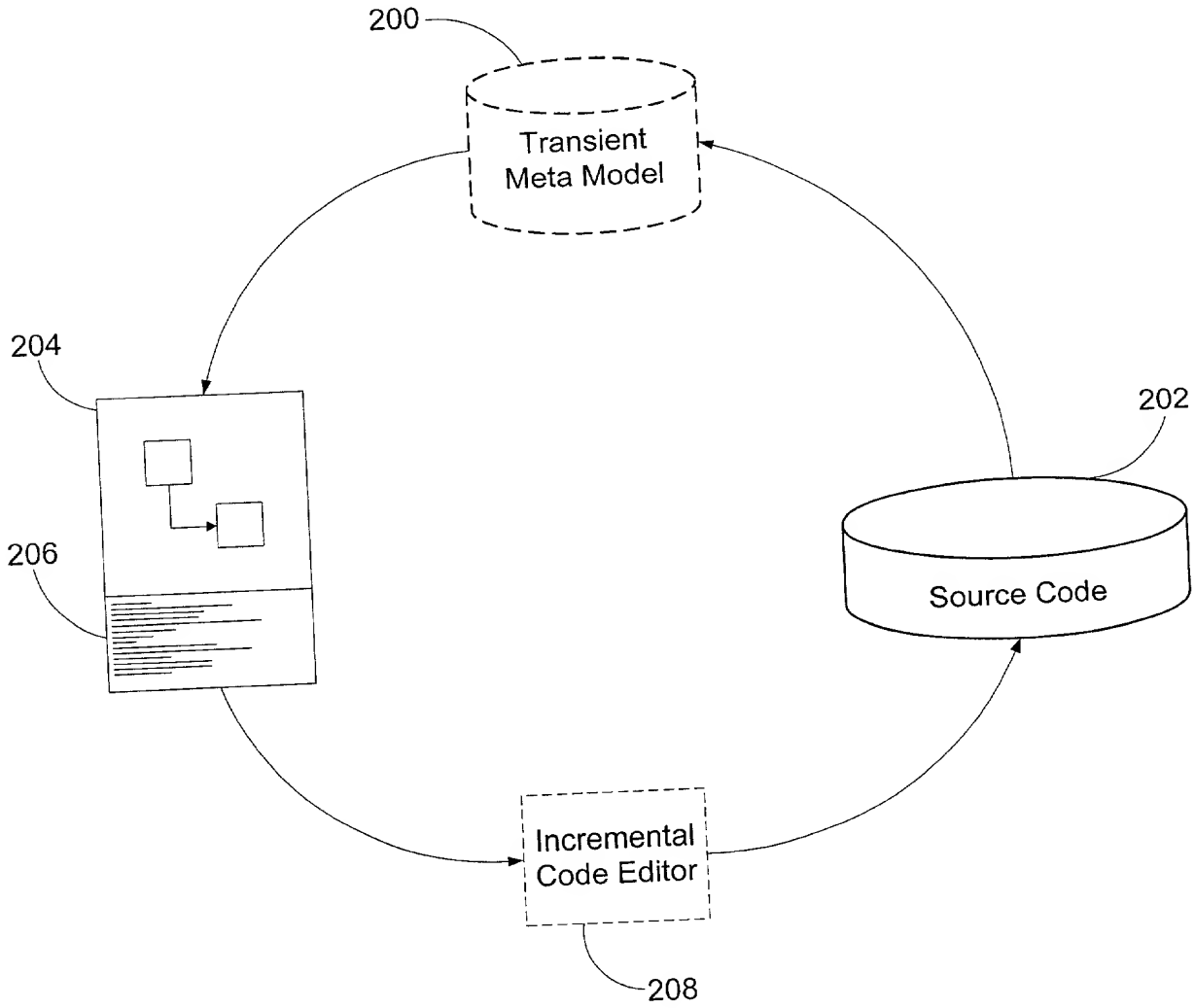
200
Transient
Meta Model
204
206
202
Source Code
Incremental
Code Editor
208

FIG. 2

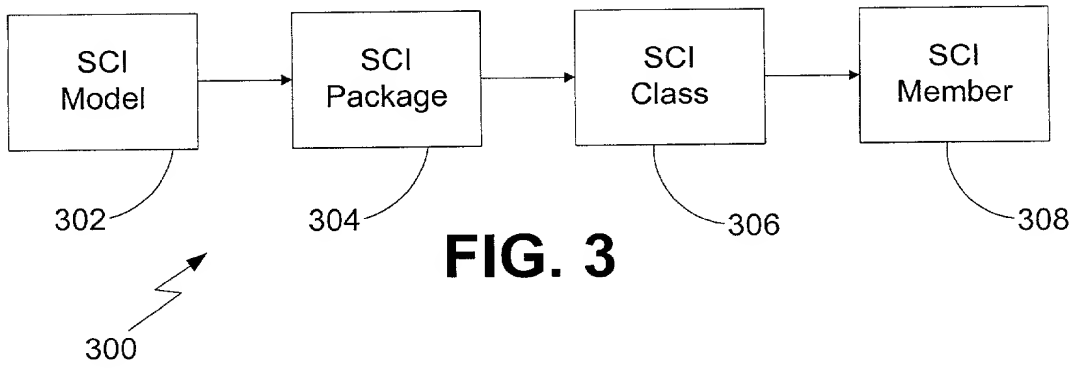

FIG. 3

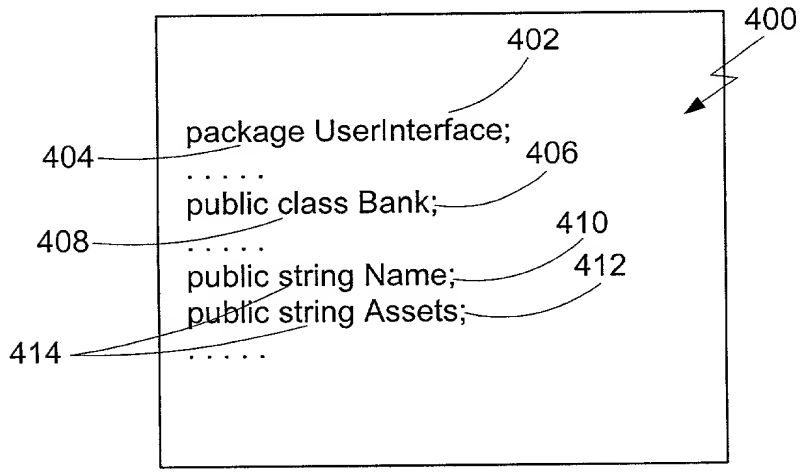

FIG. 4

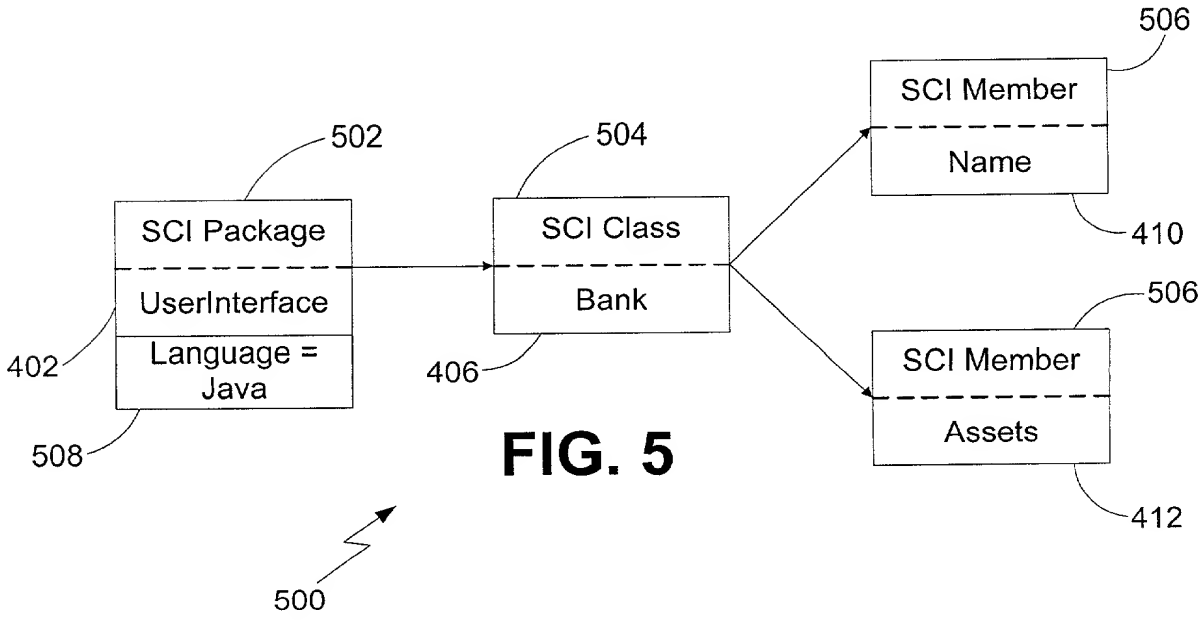

FIG. 5

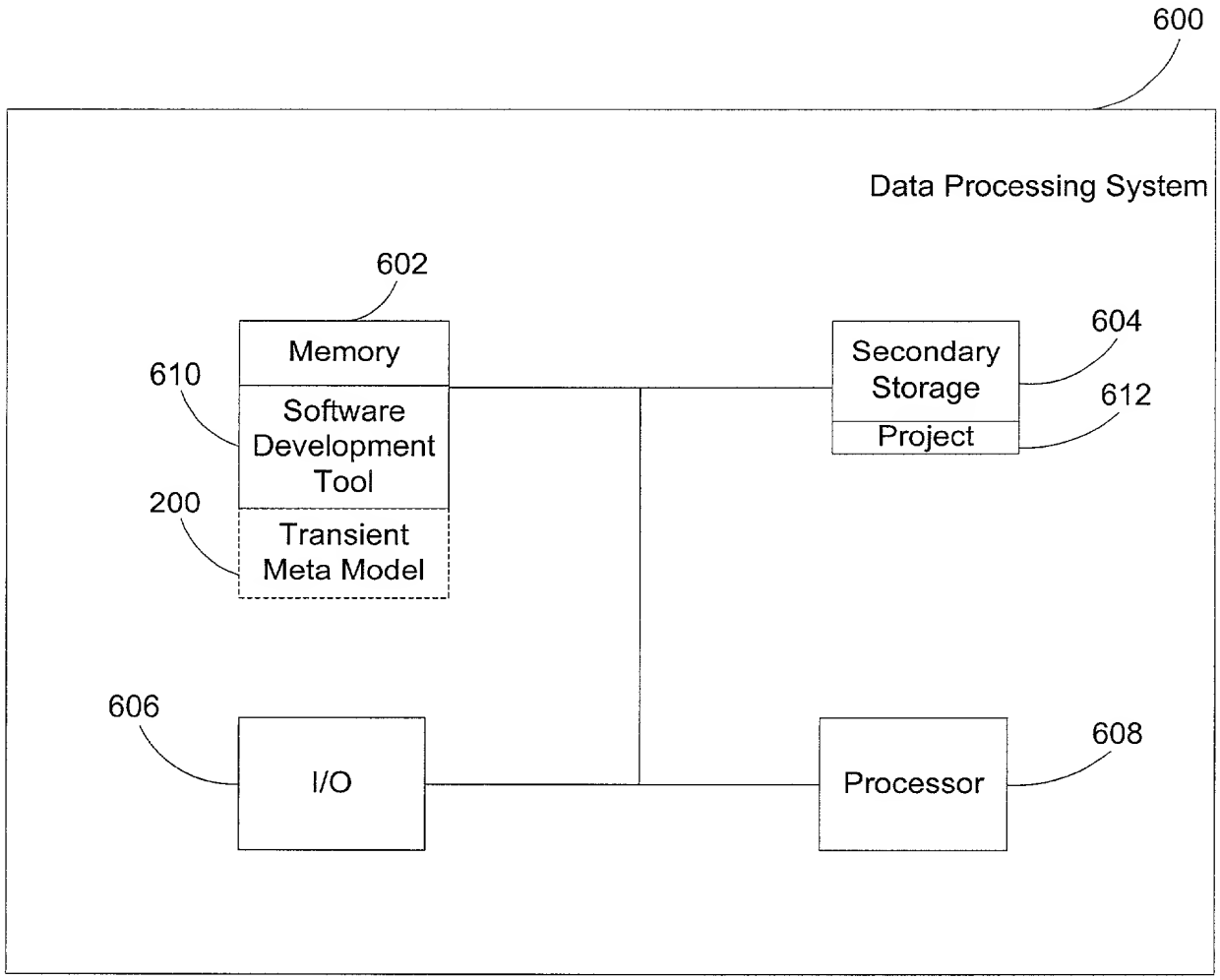
600
Data Processing System
602
Memory
610
Software Development Tool
200
Transient Meta Model
604
Secondary Storage
612
Project
606
I/O
608
Processor

FIG. 6

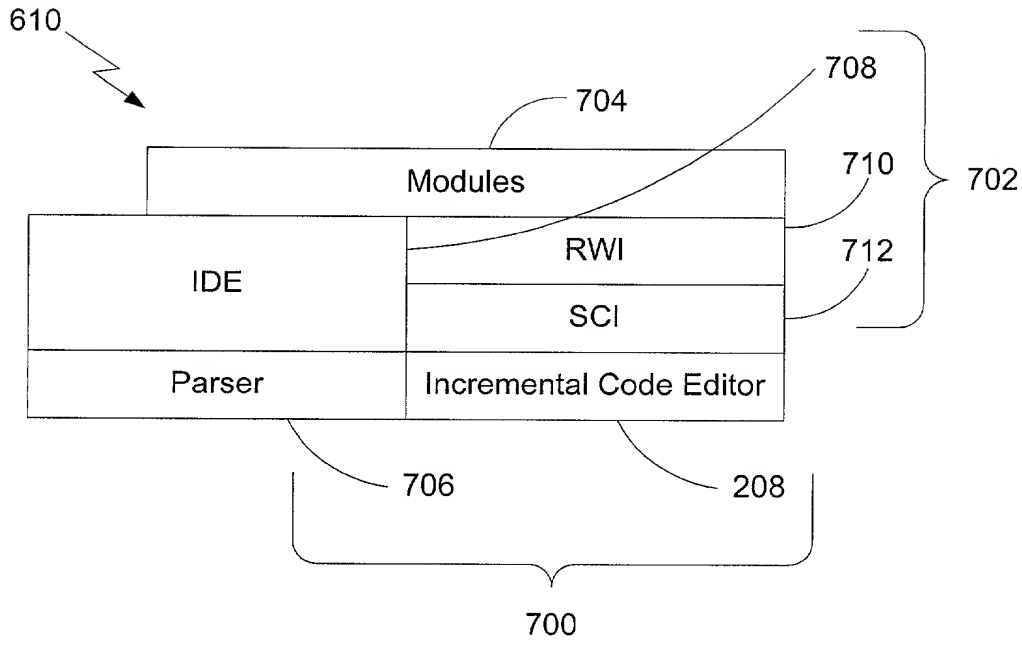
610
708
704
Modules
710
702
RWI
712
IDE
SCI
Parser
Incremental Code Editor
706
208
700

FIG. 7

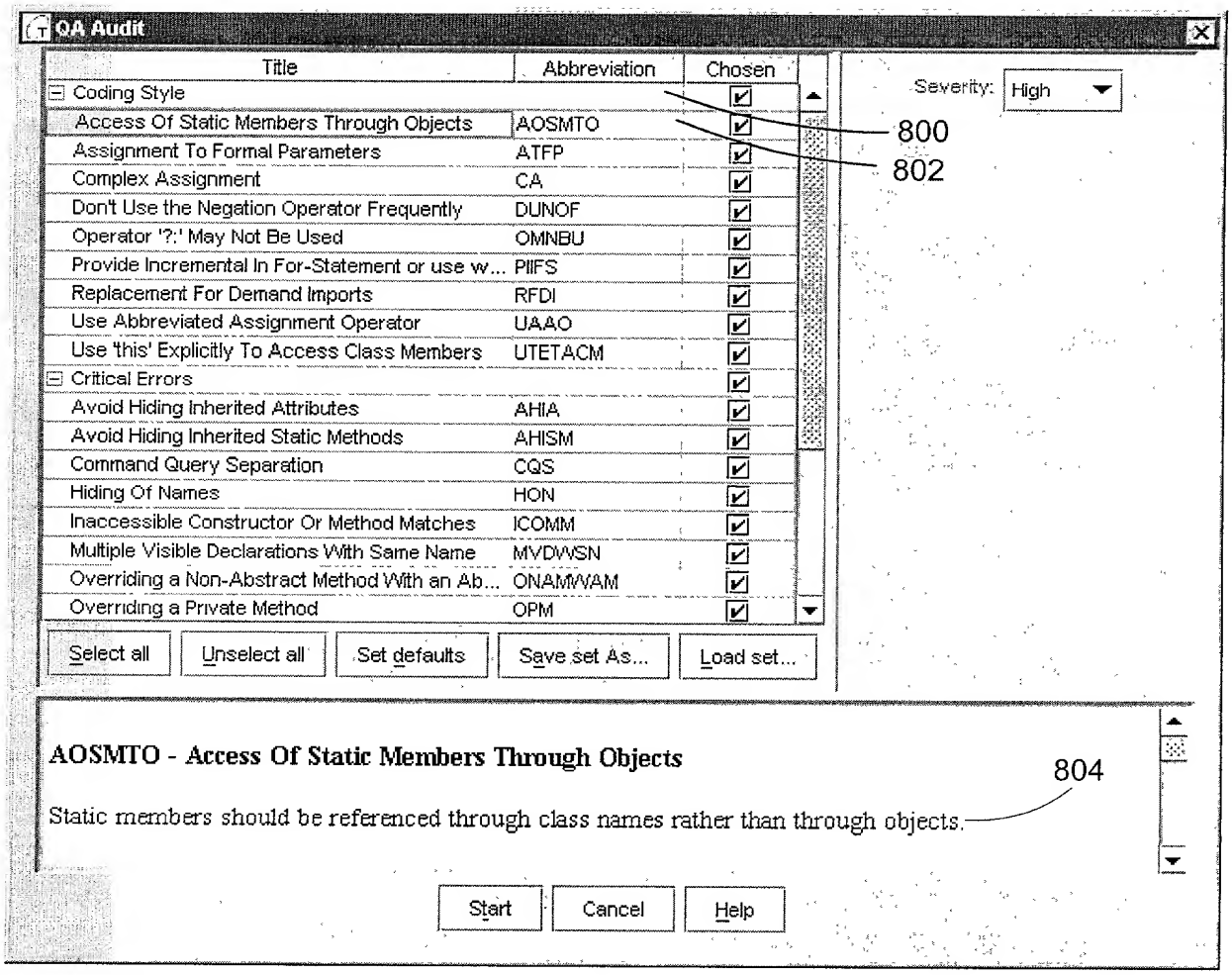
QA Audit
Title
Abbreviation
Chosen
Coding Style
Access Of Static Members Through Objects
AOSMTO
Assignment To Formal Parameters
ATFP
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Replacement For Demand Imports
RFDI
Use Abbreviated Assignment Operator
UAAO
Use 'this' Explicitly To Access Class Members
UTETACM
Critical Errors
Avoid Hiding Inherited Attributes
AHIA
Avoid Hiding Inherited Static Methods
AHISM
Command Query Separation
CQS
Hiding Of Names
HON
Inaccessible Constructor Or Method Matches
ICOMM
Multiple Visible Declarations With Same Name
MVDWSN
Overriding a Non-Abstract Method With an Ab...
ONAMWAM
Overriding a Private Method
OPM
Severity:
High
800
802
Select all
Unselect all
Set defaults
Save set As...
Load set...
AOSMTO - Access Of Static Members Through Objects
804
Static members should be referenced through class names rather than through objects.
Start
Cancel
Help

FIG. 8A

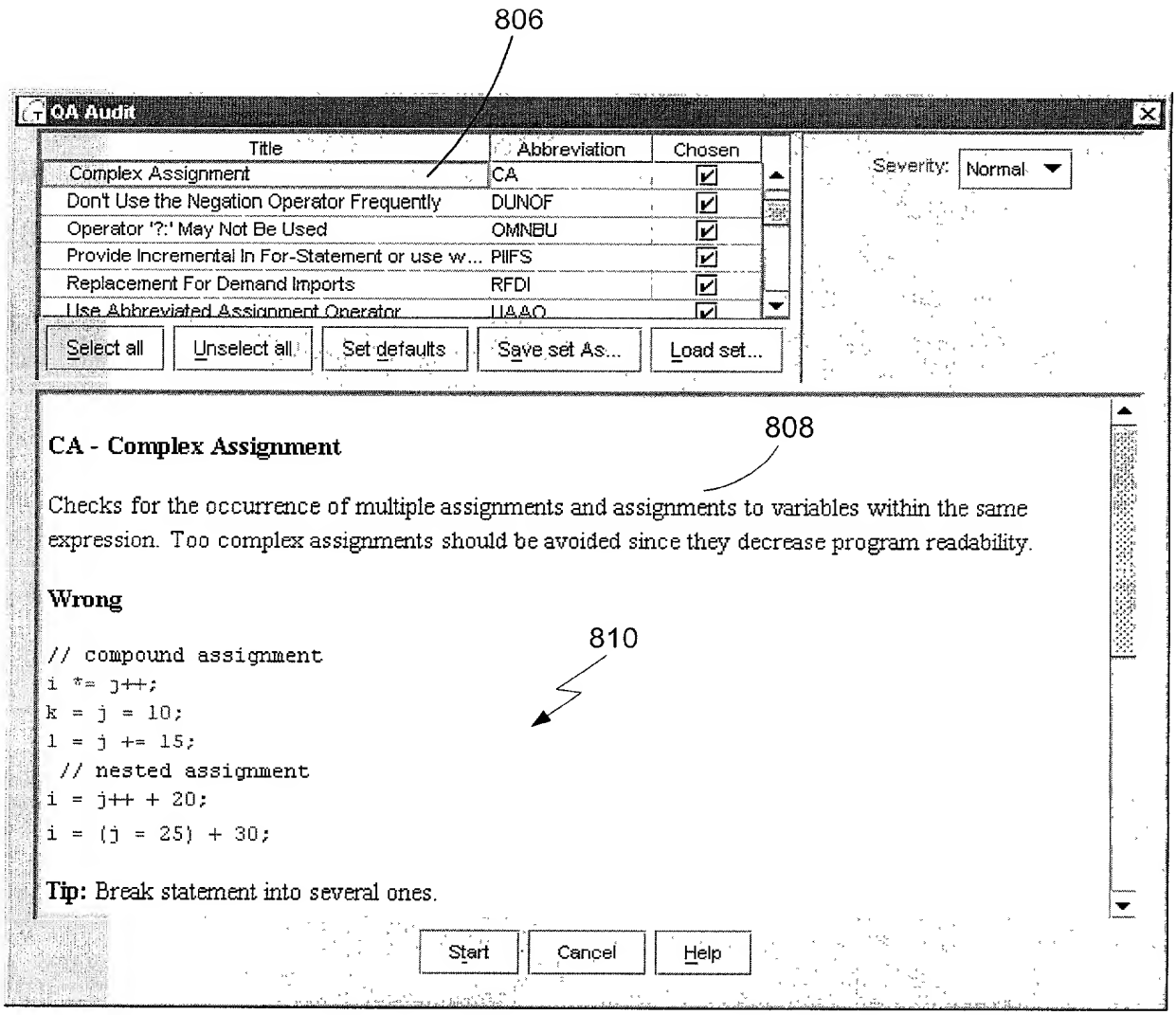
806
QA Audit
Title
Abbreviation
Chosen
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Replacement For Demand Imports
RFDI
Use Abbreviated Assignment Operator
UAAO
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
808
CA - Complex Assignment
Checks for the occurrence of multiple assignments and assignments to variables within the same expression. Too complex assignments should be avoided since they decrease program readability.
Wrong
810
// compound assignment
i *= j++;
k = j = 10;
l = j += 15;
// nested assignment
i = j++ + 20;
i = (j = 25) + 30;
Tip: Break statement into several ones.
Start
Cancel
Help

FIG. 8B

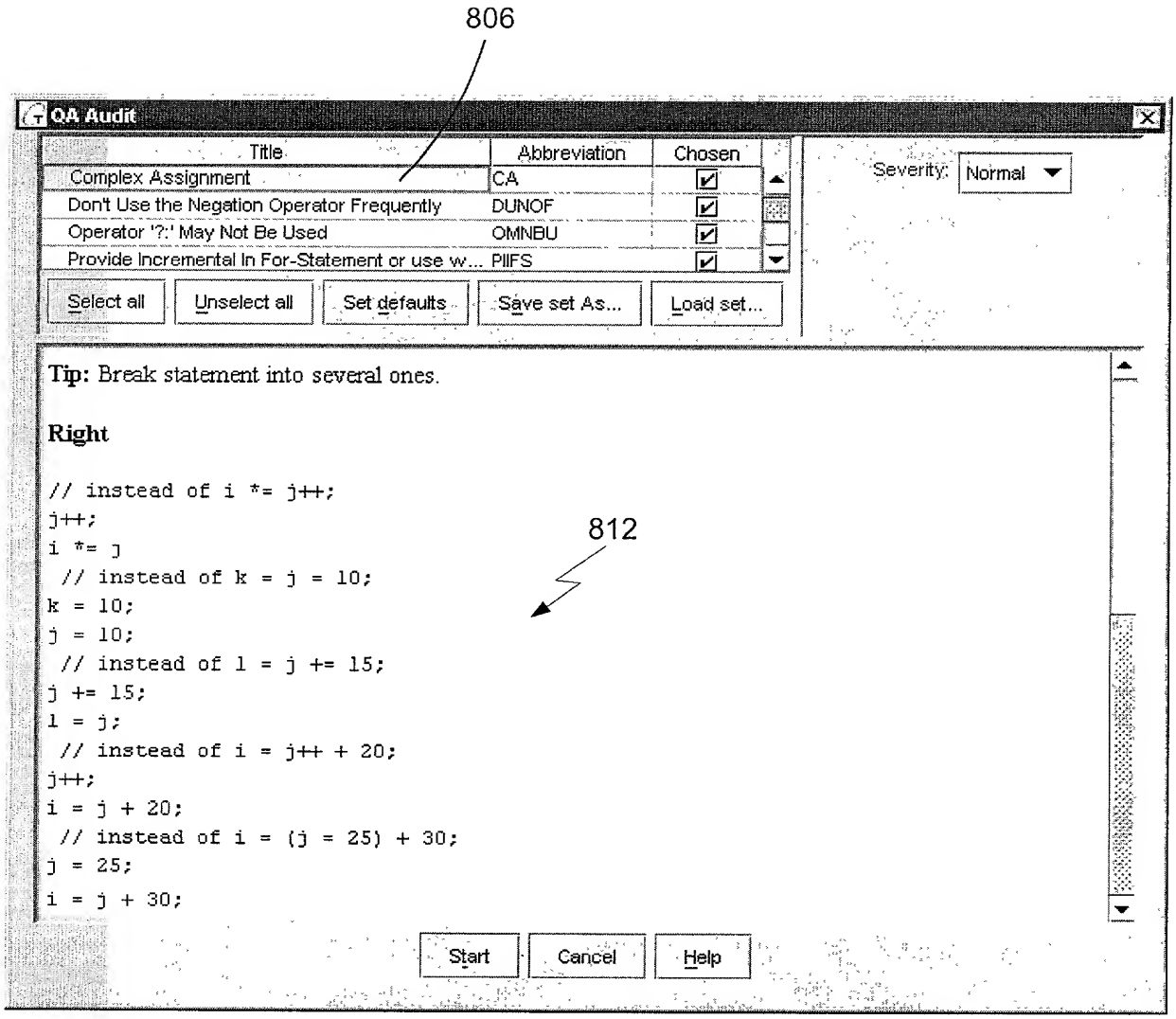
806
QA Audit
Title
Abbreviation
Chosen
Complex Assignment
CA
Don't Use the Negation Operator Frequently
DUNOF
Operator '?:' May Not Be Used
OMNBU
Provide Incremental In For-Statement or use w...
PIIFS
Severity:
Normal
Select all
Unselect all
Set defaults
Save set As...
Load set...
Tip: Break statement into several ones.
Right
// instead of i *= j++;
j++;
i *= j
// instead of k = j = 10;
k = 10;
j = 10;
// instead of l = j += 15;
j += 15;
l = j;
// instead of i = j++ + 20;
j++;
i = j + 20;
// instead of i = (j = 25) + 30;
j = 25;
i = j + 30;
812
Start
Cancel
Help

FIG. 8C

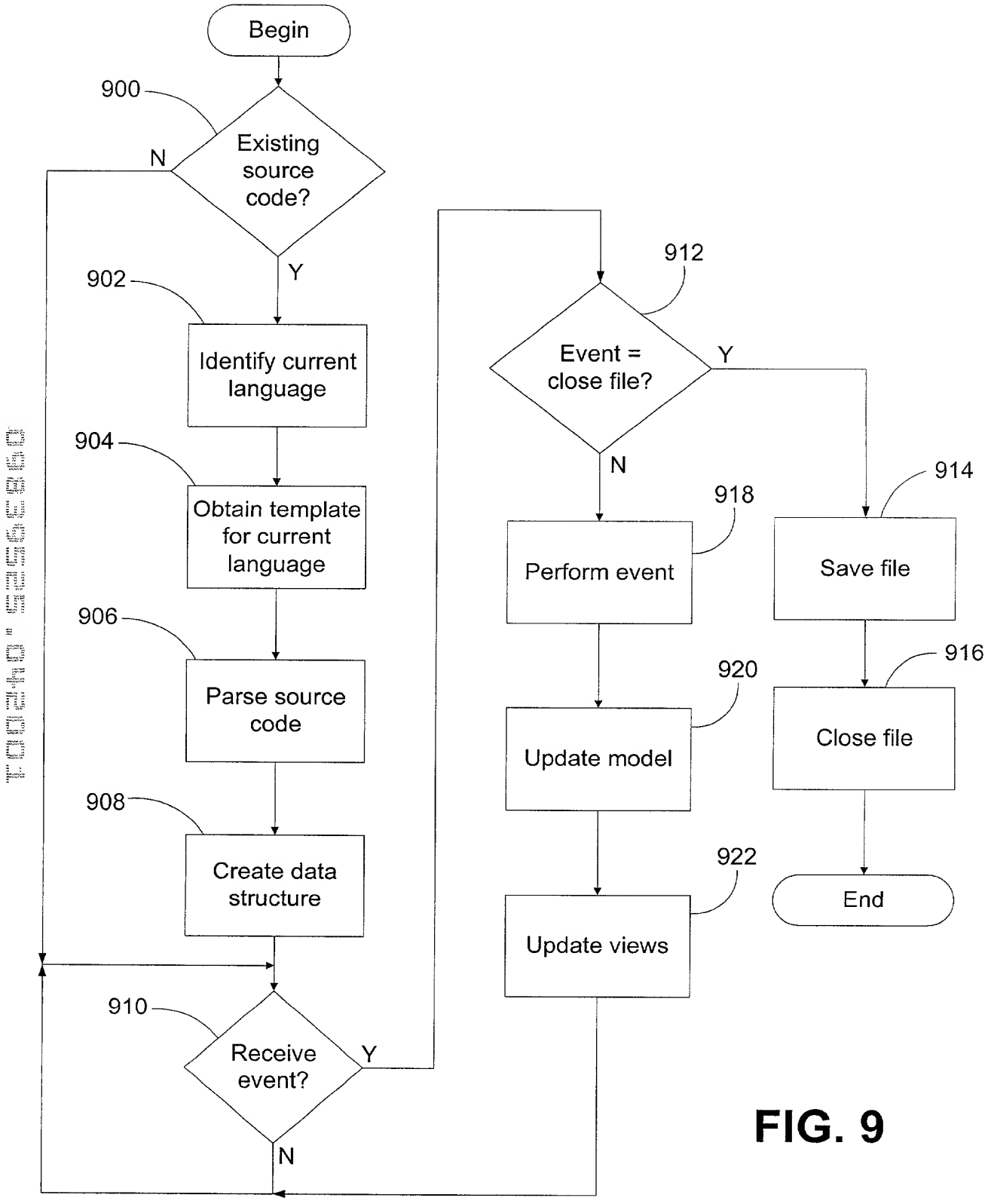
Begin
900
Existing source code?
N
Y
902
Identify current language
904
Obtain template for current language
906
Parse source code
908
Create data structure
910
Receive event?
Y
N
912
Event = close file?
Y
N
914
Save file
916
Close file
End
918
Perform event
920
Update model
922
Update views

FIG. 9

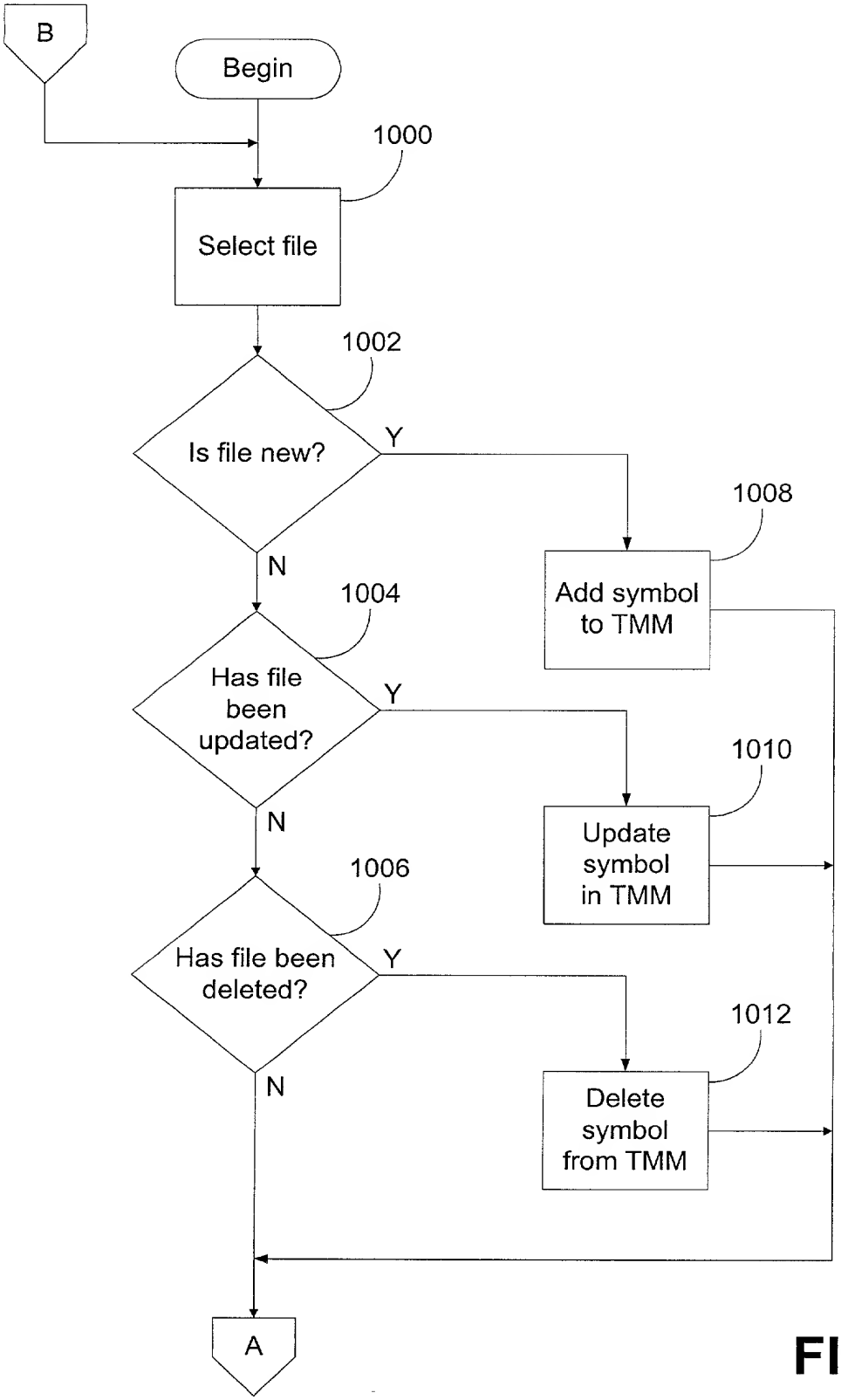
B
Begin
1000
Select file
1002
Is file new?
Y
N
1008
Add symbol to TMM
1004
Has file been updated?
Y
N
1010
Update symbol in TMM
1006
Has file been deleted?
Y
N
1012
Delete symbol from TMM
A

FIG. 10A

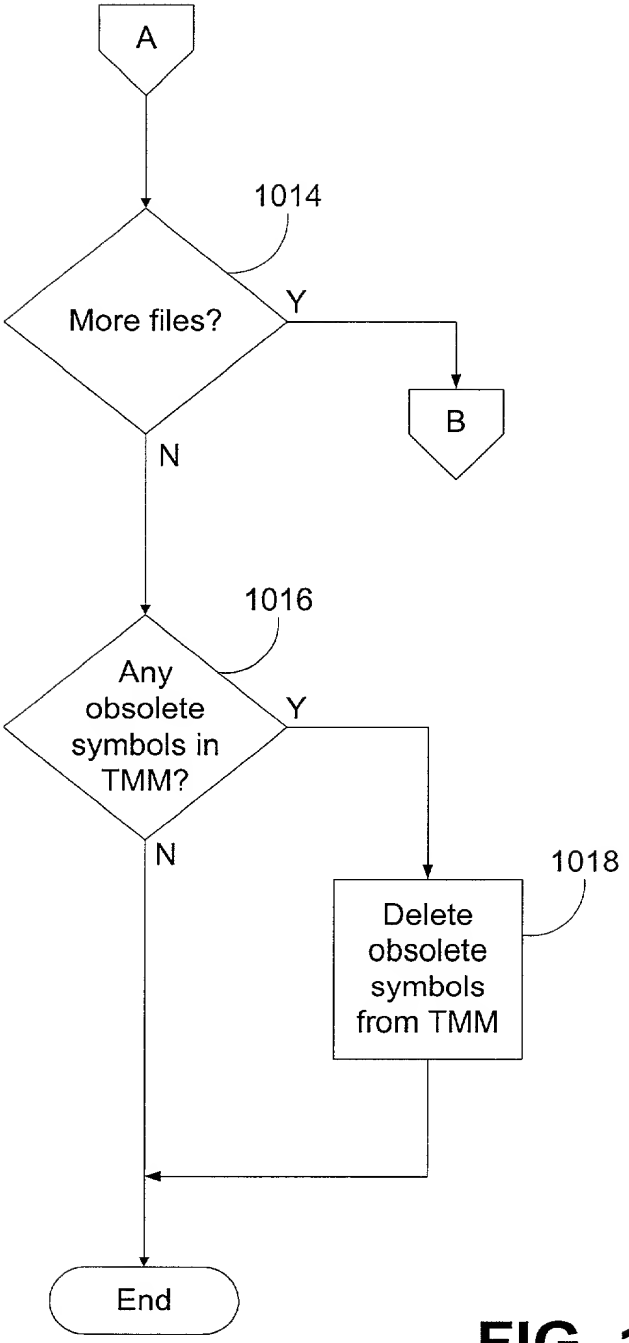
A
1014
More files?
Y
B
N
1016
Any obsolete symbols in TMM?
Y
N
1018
Delete obsolete symbols from TMM
End

FIG. 10B

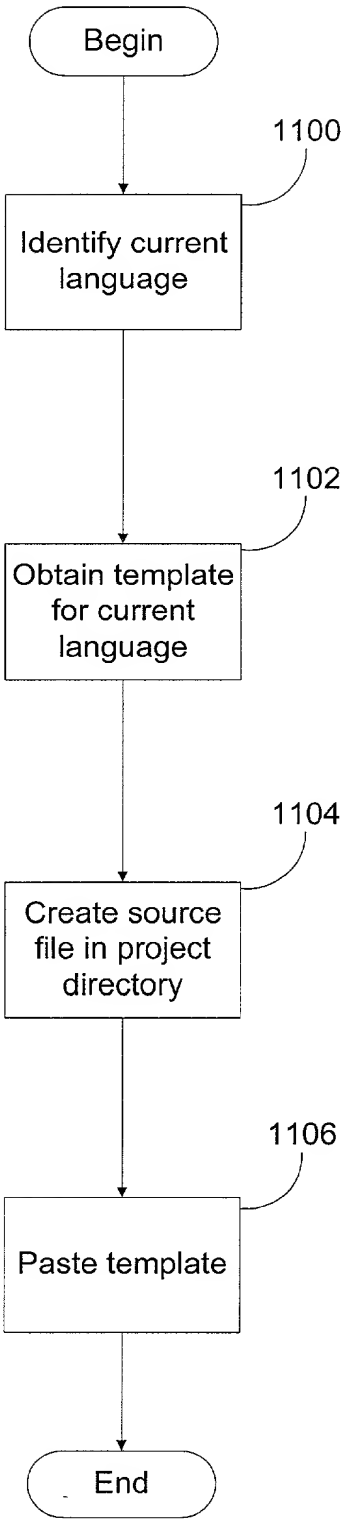
Begin
1100
Identify current language
1102
Obtain template for current language
1104
Create source file in project directory
1106
Paste template
End

FIG. 11

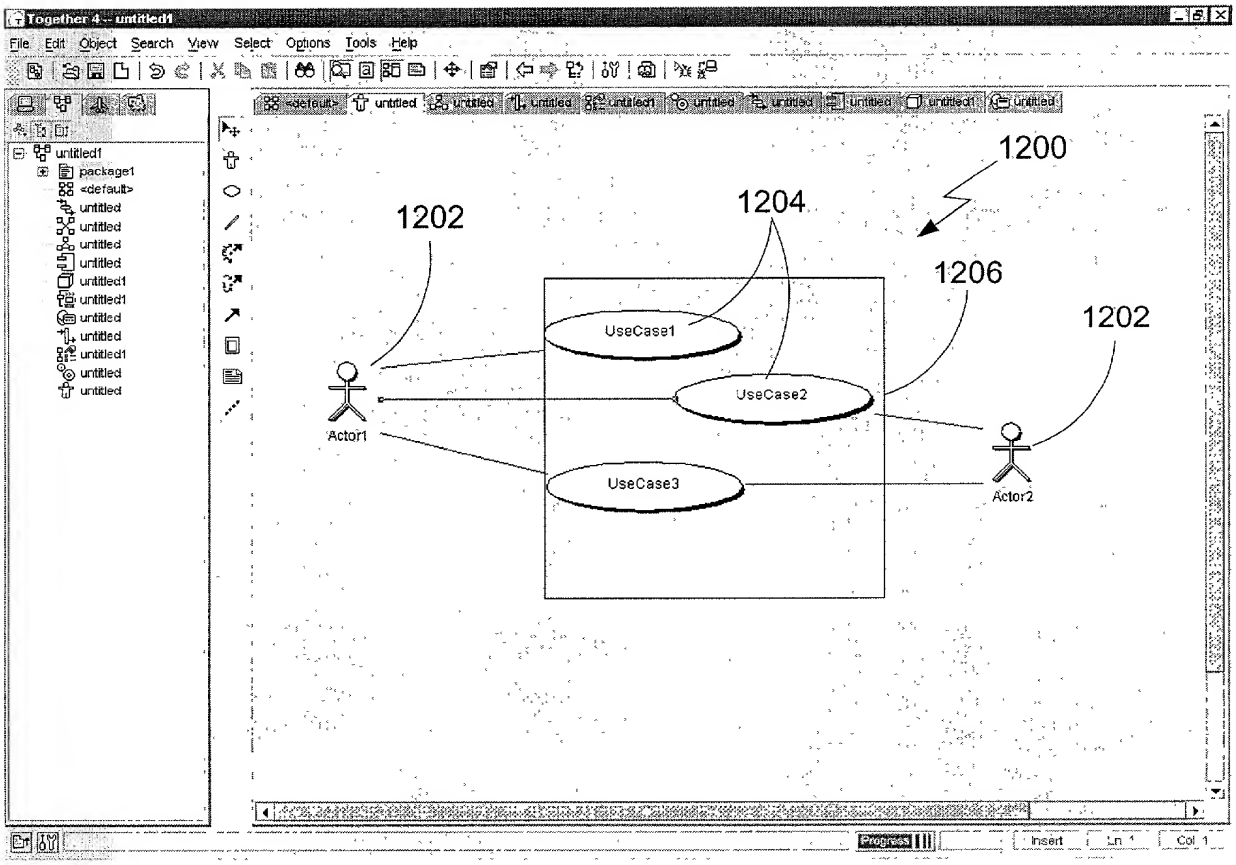
Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1200
1202
1204
1206
1202
UseCase1
UseCase2
UseCase3
Actor1
Actor2
Insert
Ln 1
Col 1

FIG. 12

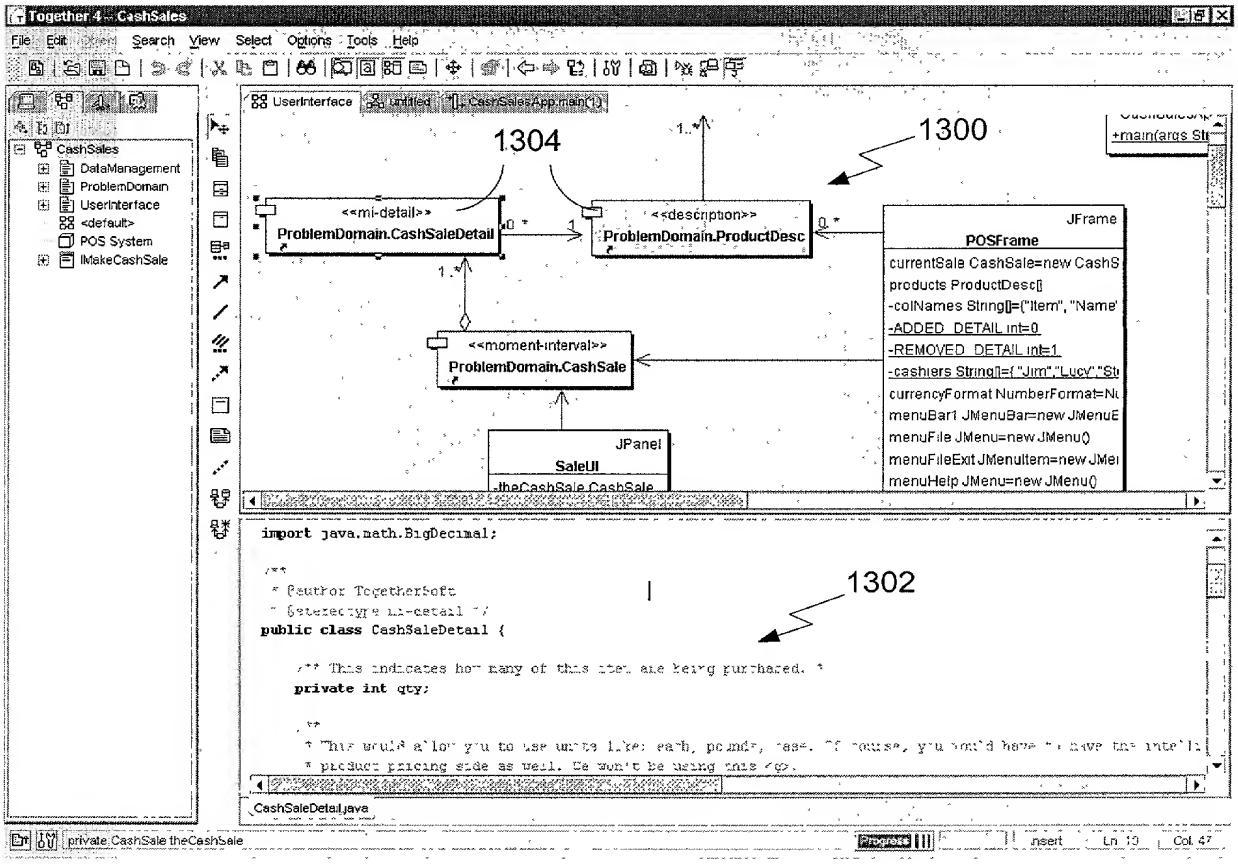
Together 4 - CashSales
File Edit Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
<default>
POS System
IMakeCashSale
UserInterface
1304
1300
<<mi-detail>>
ProblemDomain.CashSaleDetail
<<description>>
ProblemDomain.ProductDesc
JFrame
POSFrame
currentSale CashSale=new CashS
products ProductDesc[]
-colNames String[]={"Item","Name"
-ADDED_DETAIL int=0
-REMOVED_DETAIL int=1
-cashiers String[]={"Jim","Lucy","St
currencyFormat NumberFormat=Nu
menuBar1 JMenuBar=new JMenuB
menuFile JMenu=new JMenu()
menuFileExit JMenuItem=new JMe
menuHelp JMenu=new JMenu()
<<moment-interval>>
ProblemDomain.CashSale
JPanel
SaleUI
1302
import java.math.BigDecimal;
public class CashSaleDetail {
private int qty;
CashSaleDetail.java
private CashSale theCashSale
Insert

FIG. 13

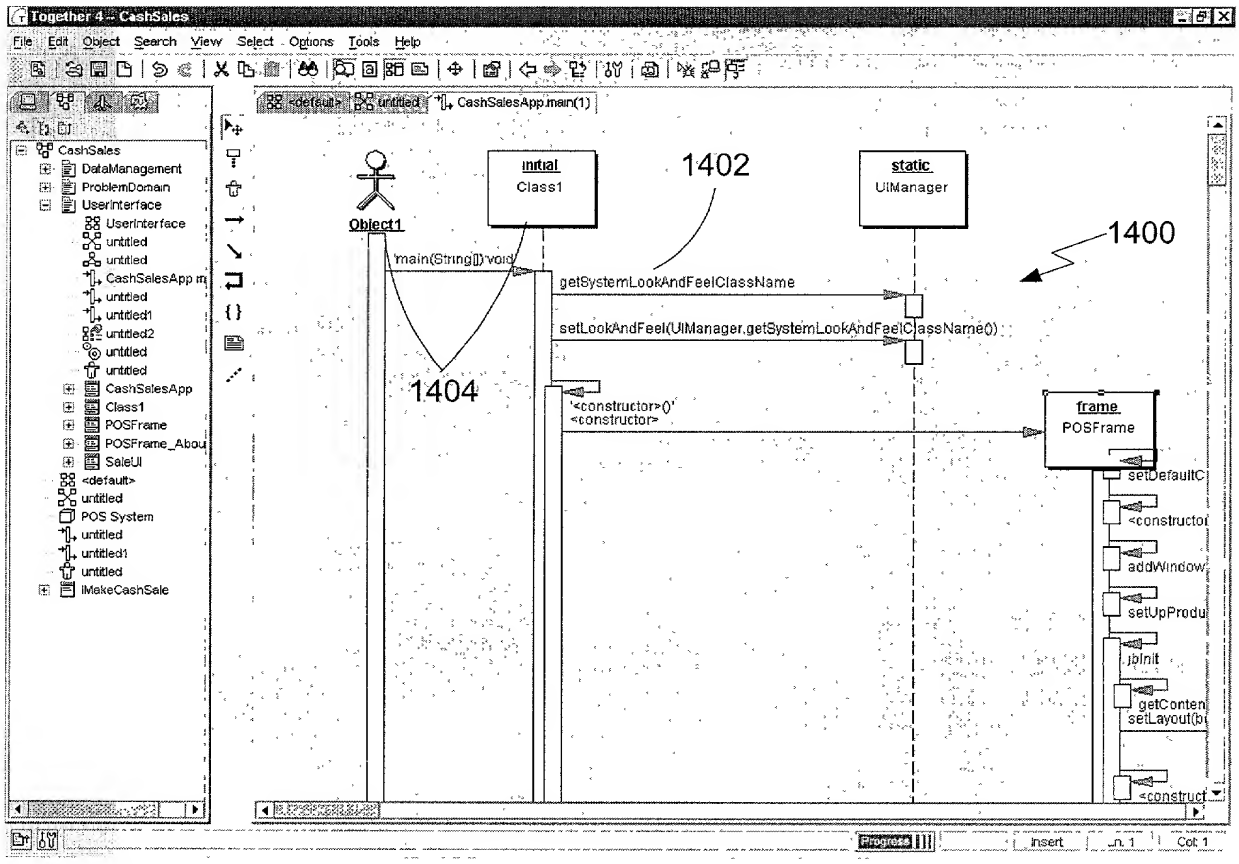
Together 4 – CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp.main(1)
Object1
initial
Class1
1402
static
UIManager
1400
'main(String[])'void
getSystemLookAndFeelClassName
setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
1404
'<constructor>()'
<constructor>
frame
POSFrame
setDefaultC
<constructor
addWindow
setUpProdu
jbInit
getConten
setLayout(b
<construct
Projects
Insert
Ln 1
Col 1

FIG. 14

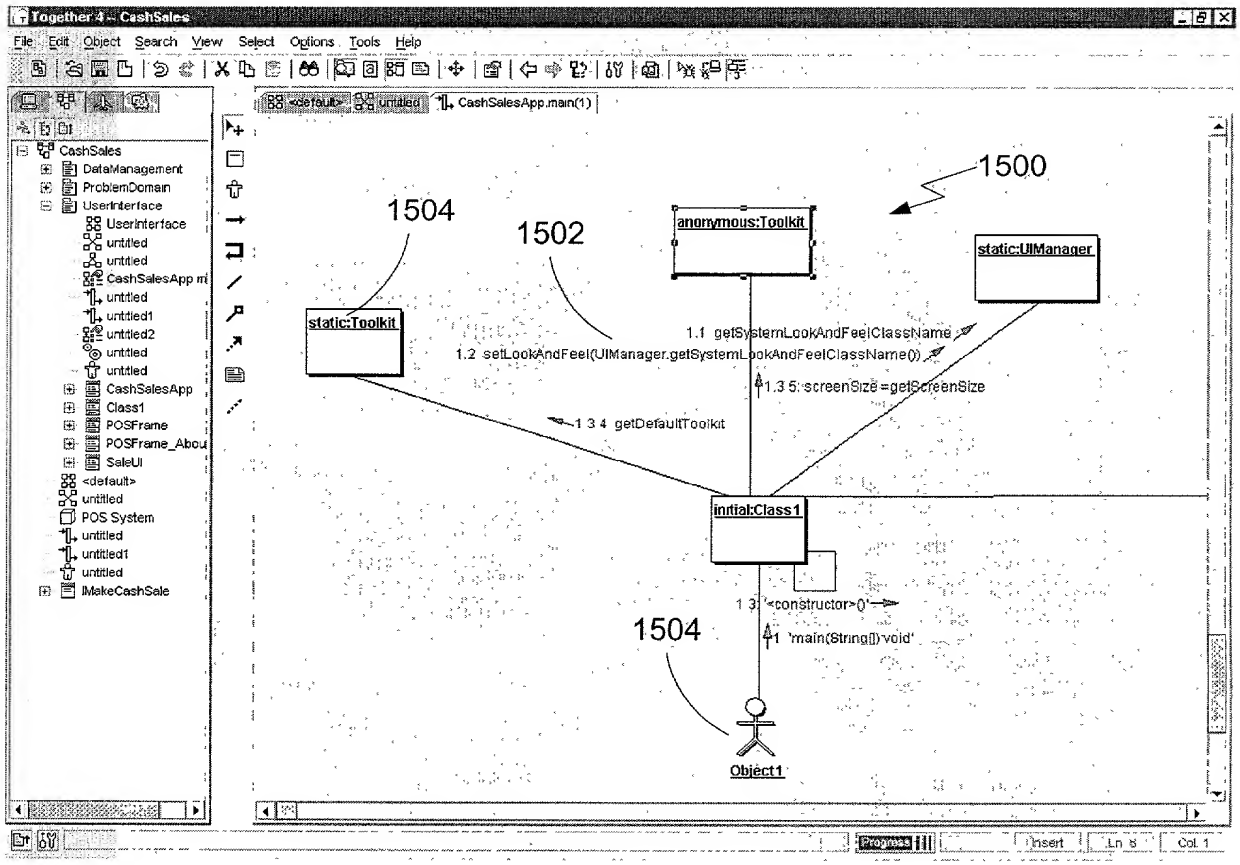
Together 4 - CashSales
File Edit Object Search View Select Options Tools Help
CashSales
DataManagement
ProblemDomain
UserInterface
UserInterface
untitled
untitled
CashSalesApp m
untitled
untitled1
untitled2
untitled
untitled
CashSalesApp
Class1
POSFrame
POSFrame_Abou
SaleUI
<default>
untitled
POS System
untitled
untitled1
untitled
IMakeCashSale
<default>
untitled
CashSalesApp.main(1)
1500
1504
1502
anonymous:Toolkit
static:UIManager
static:Toolkit
1.1 getSystemLookAndFeelClassName
1.2 setLookAndFeel(UIManager.getSystemLookAndFeelClassName())
1.3 5: screenSize=getScreenSize
1 3 4 getDefaultToolkit
initial:Class1
1 3 '<constructor>()'
1 'main(String[])'void'
1504
Object1
Insert
Ln 8
Col 1

FIG. 15

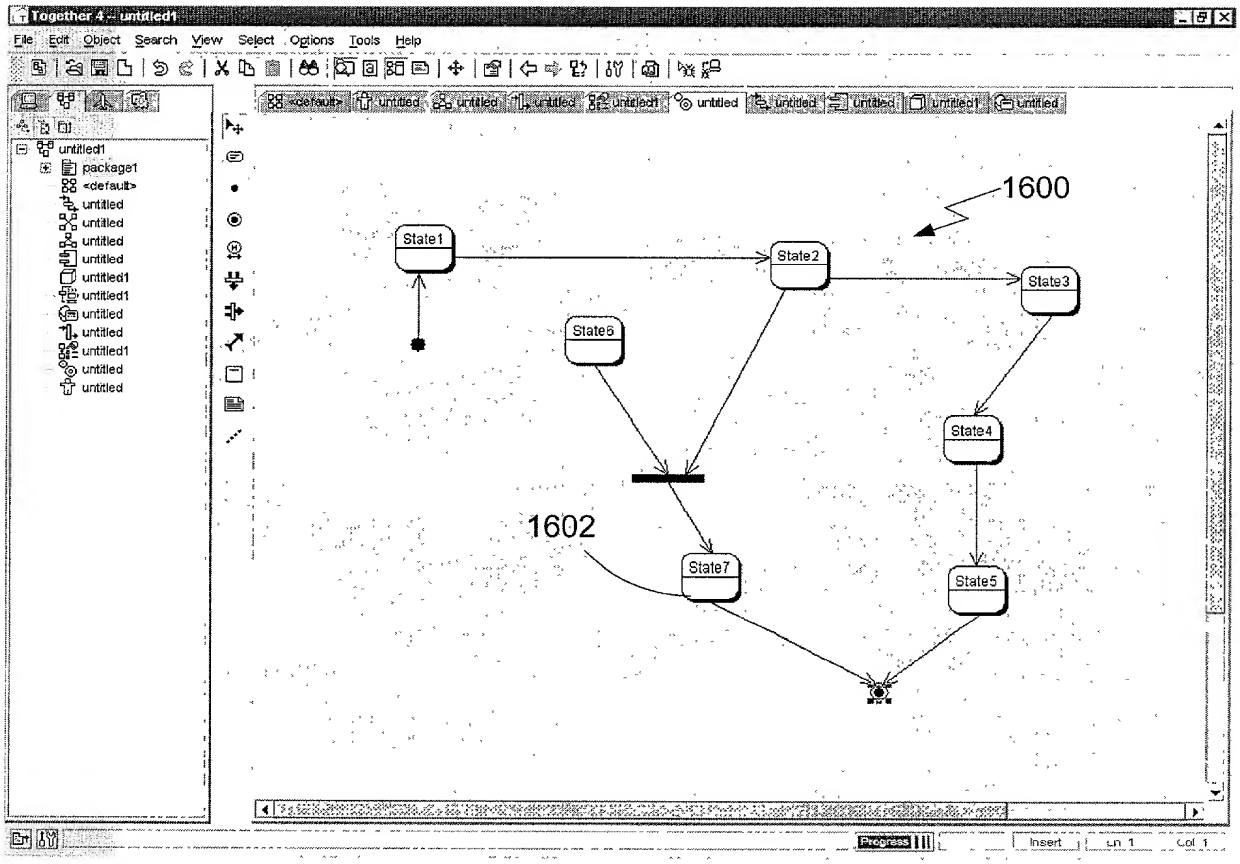
Together 4 - untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled1
1600
State1
State2
State3
State6
State4
1602
State7
State5
Progress
Insert
Ln 1
Col 1

FIG. 16

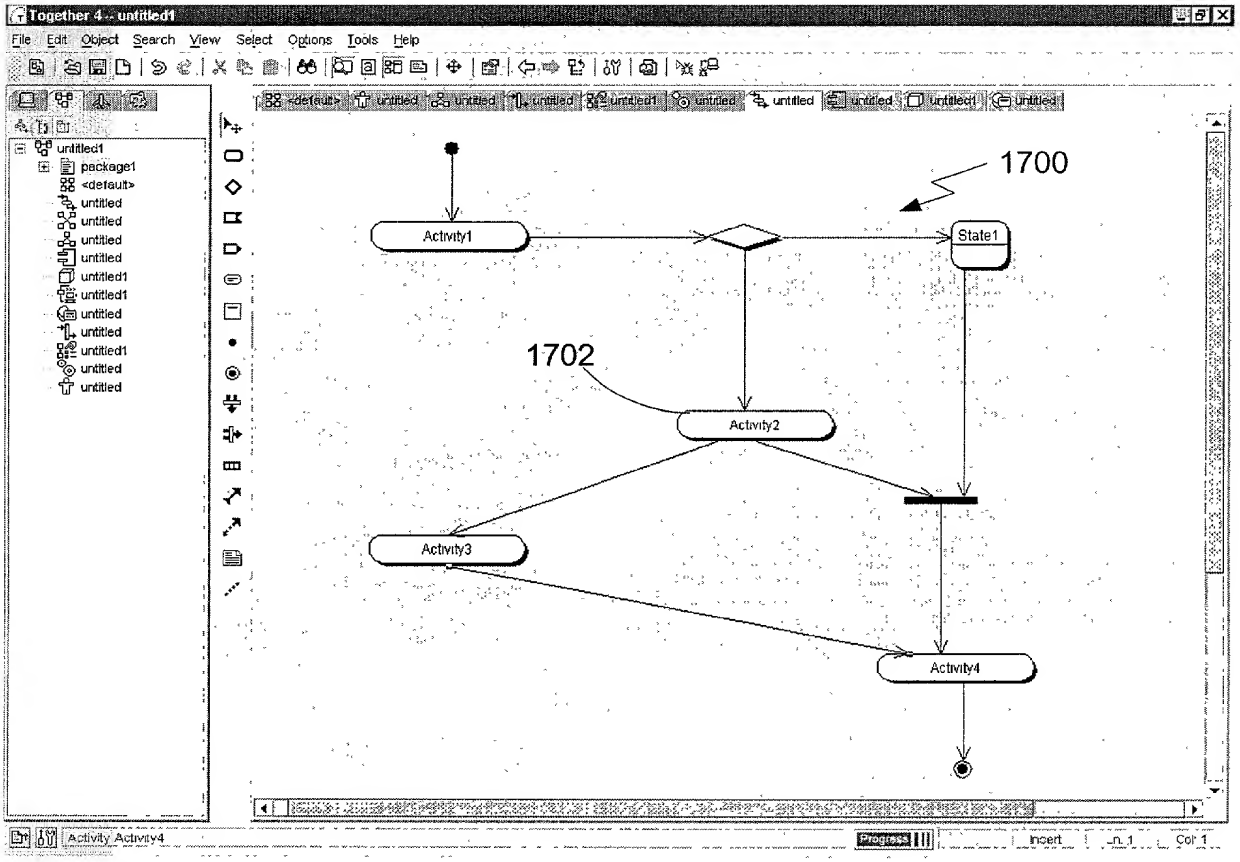
Together 4 - untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
1700
Activity1
State1
1702
Activity2
Activity3
Activity4
Activity Activity4
Insert

FIG. 17

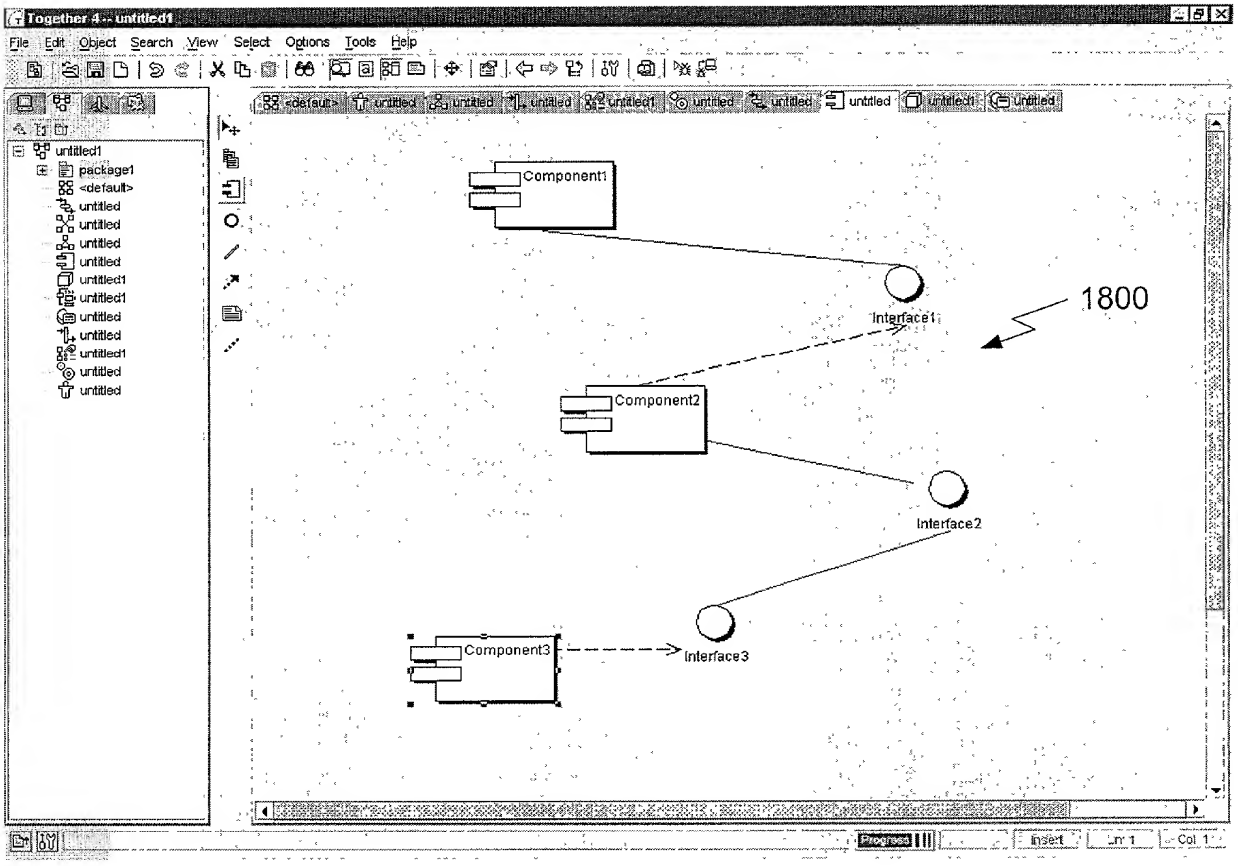
Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
Component1
Interface1
1800
Component2
Interface2
Component3
Interface3
Insert
Ln 1
Col 1

FIG. 18

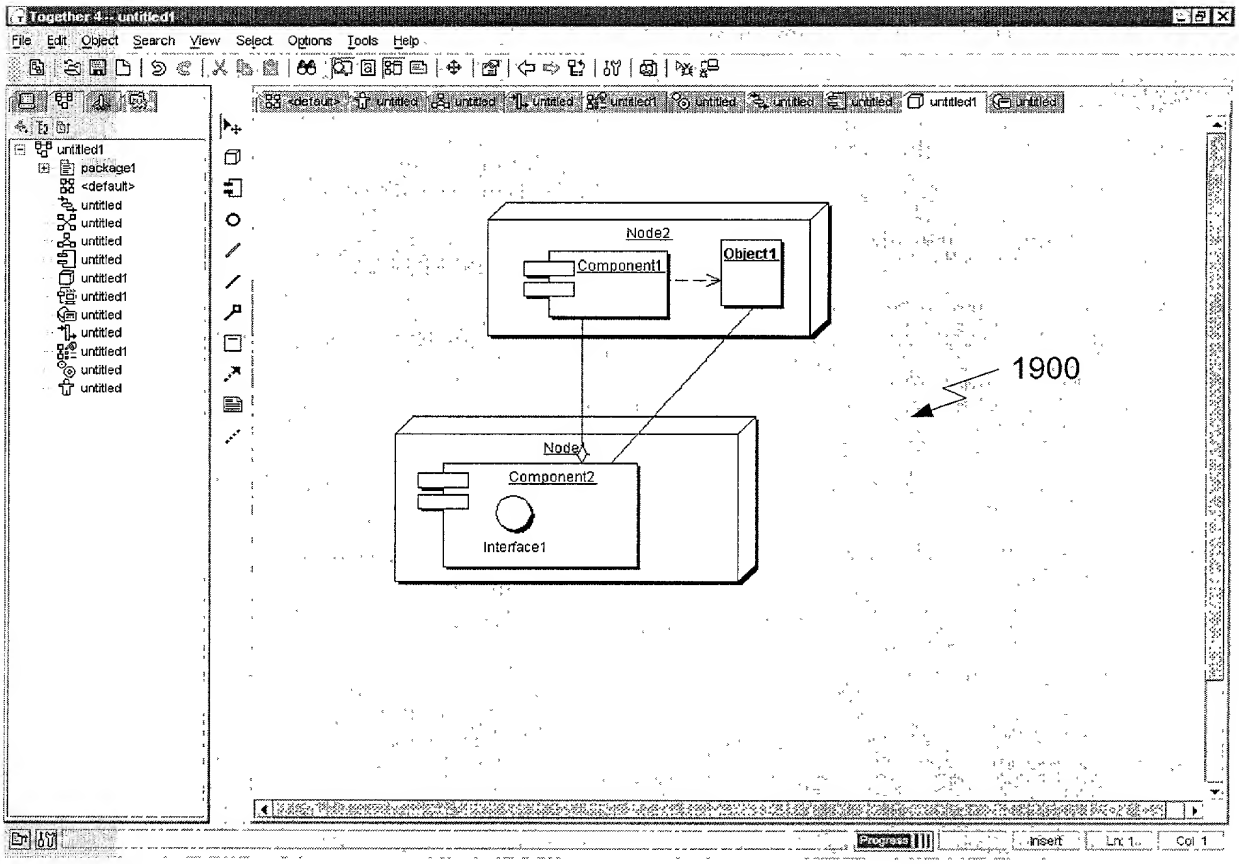
Together 4 -- untitled1
File Edit Object Search View Select Options Tools Help
untitled1
package1
<default>
untitled
untitled
untitled
untitled
untitled1
untitled1
untitled
untitled
untitled1
untitled
untitled
Node2
Component1
Object1
1900
Node
Component2
Interface1
Progress
Insert
Ln 1..
Col 1

FIG. 19

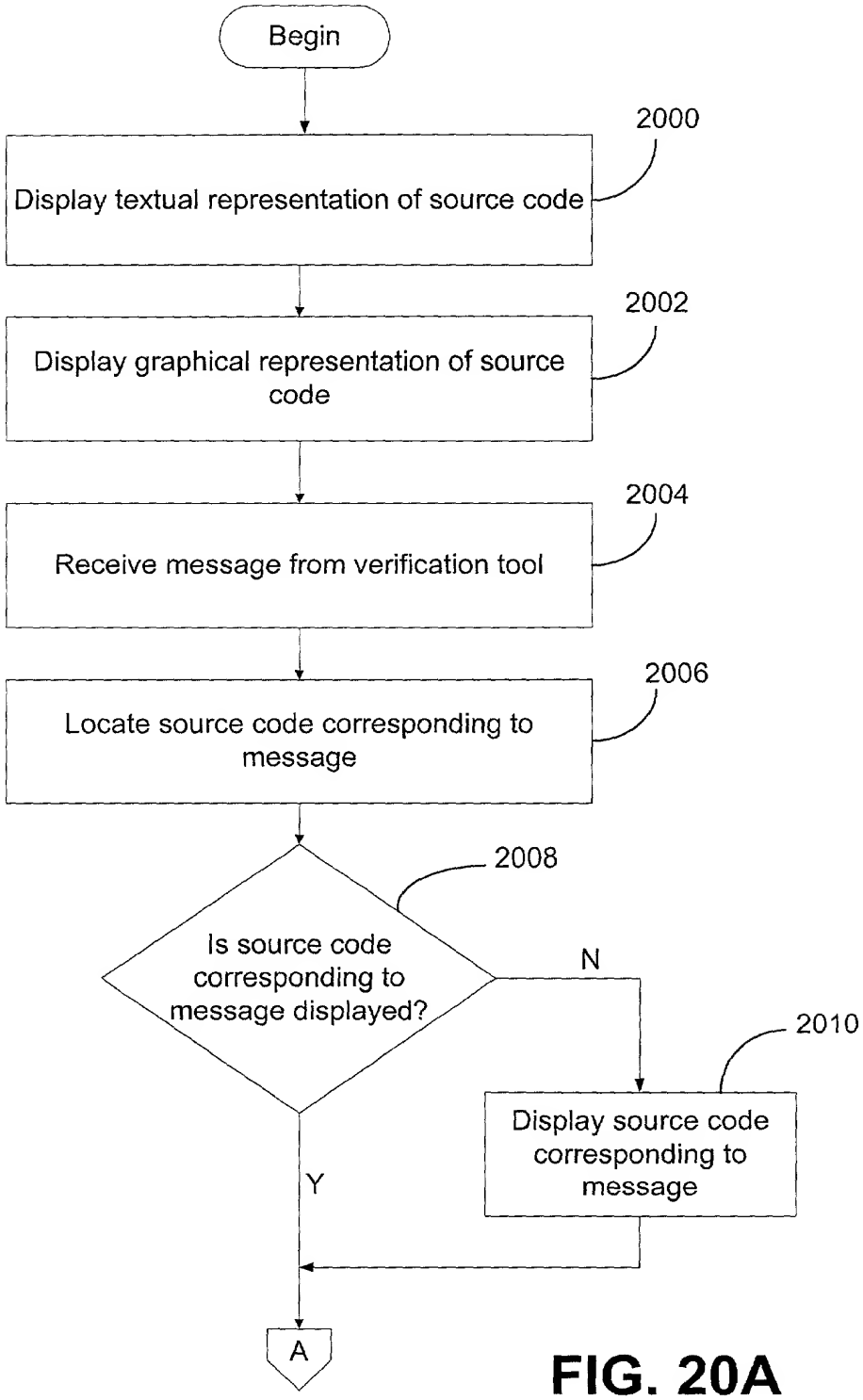
Begin
2000
Display textual representation of source code
2002
Display graphical representation of source code
2004
Receive message from verification tool
2006
Locate source code corresponding to message
2008
Is source code corresponding to message displayed?
N
2010
Display source code corresponding to message
Y
A

FIG. 20A

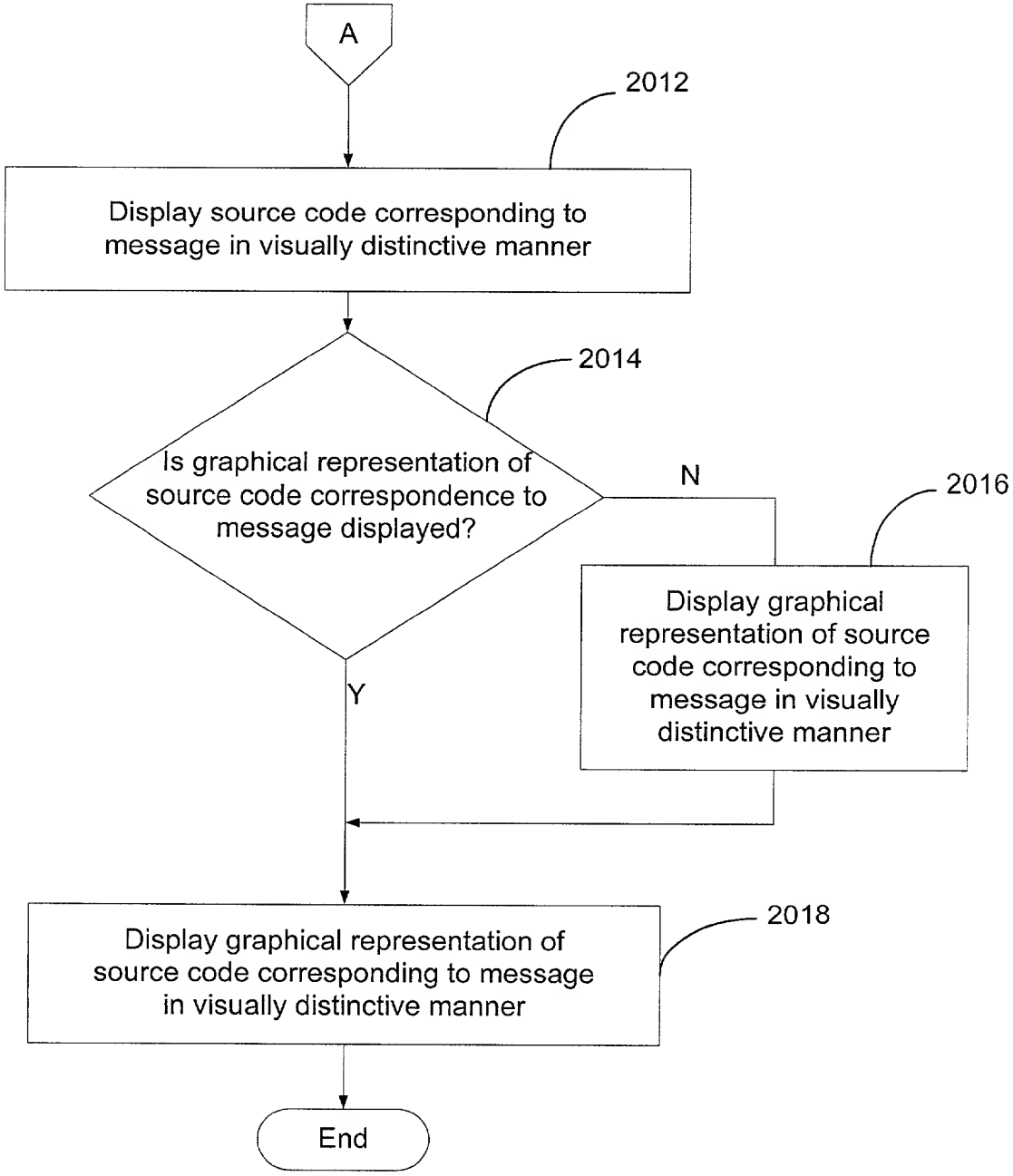
A
2012
Display source code corresponding to message in visually distinctive manner
2014
Is graphical representation of source code correspondence to message displayed?
N
2016
Display graphical representation of source code corresponding to message in visually distinctive manner
Y
2018
Display graphical representation of source code corresponding to message in visually distinctive manner
End

FIG. 20B

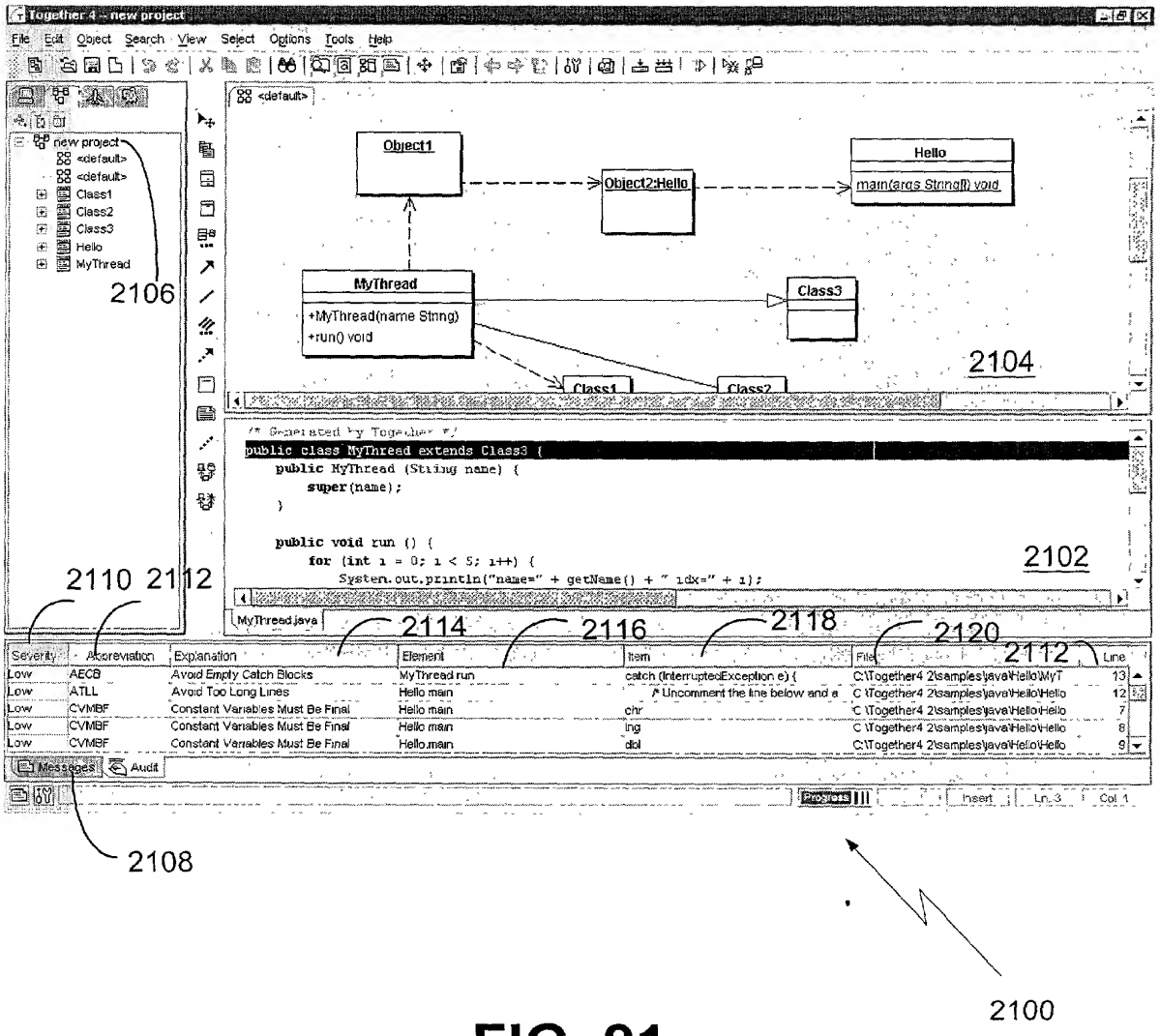
Together 4 - new project
File Edit Object Search View Select Options Tools Help
new project
<default>
<default>
Class1
Class2
Class3
Hello
MyThread
2106
<default>
Object1
Object2:Hello
Hello
main(args String[]) void
MyThread
+MyThread(name String)
+run() void
Class3
Class1
Class2
2104
public class MyThread extends Class3 {
public MyThread (String name) {
super(name);
}
public void run () {
for (int i = 0; i < 5; i++) {
System.out.println("name=" + getName() + " idx=" + i);
2102
MyThread.java
2110 2112
2114
2116
2118
2120
2112
Severity Abbreviation Explanation Element Item File Line
Low AECB Avoid Empty Catch Blocks MyThread.run catch (InterruptedException e) { C:\Together4 2\samples\java\Hello\MyT 13
Low ATLL Avoid Too Long Lines Hello.main /* Uncomment the line below and a C:\Together4 2\samples\java\Hello\Hello 12
Low CVMBF Constant Variables Must Be Final Hello.main chr C:\Together4 2\samples\java\Hello\Hello 7
Low CVMBF Constant Variables Must Be Final Hello.main ing C:\Together4 2\samples\java\Hello\Hello 8
Low CVMBF Constant Variables Must Be Final Hello.main dbl C:\Together4 2\samples\java\Hello\Hello 9
Messages Audit
Projects
Insert
Ln 3
Col 1
2108
2100

FIG. 21

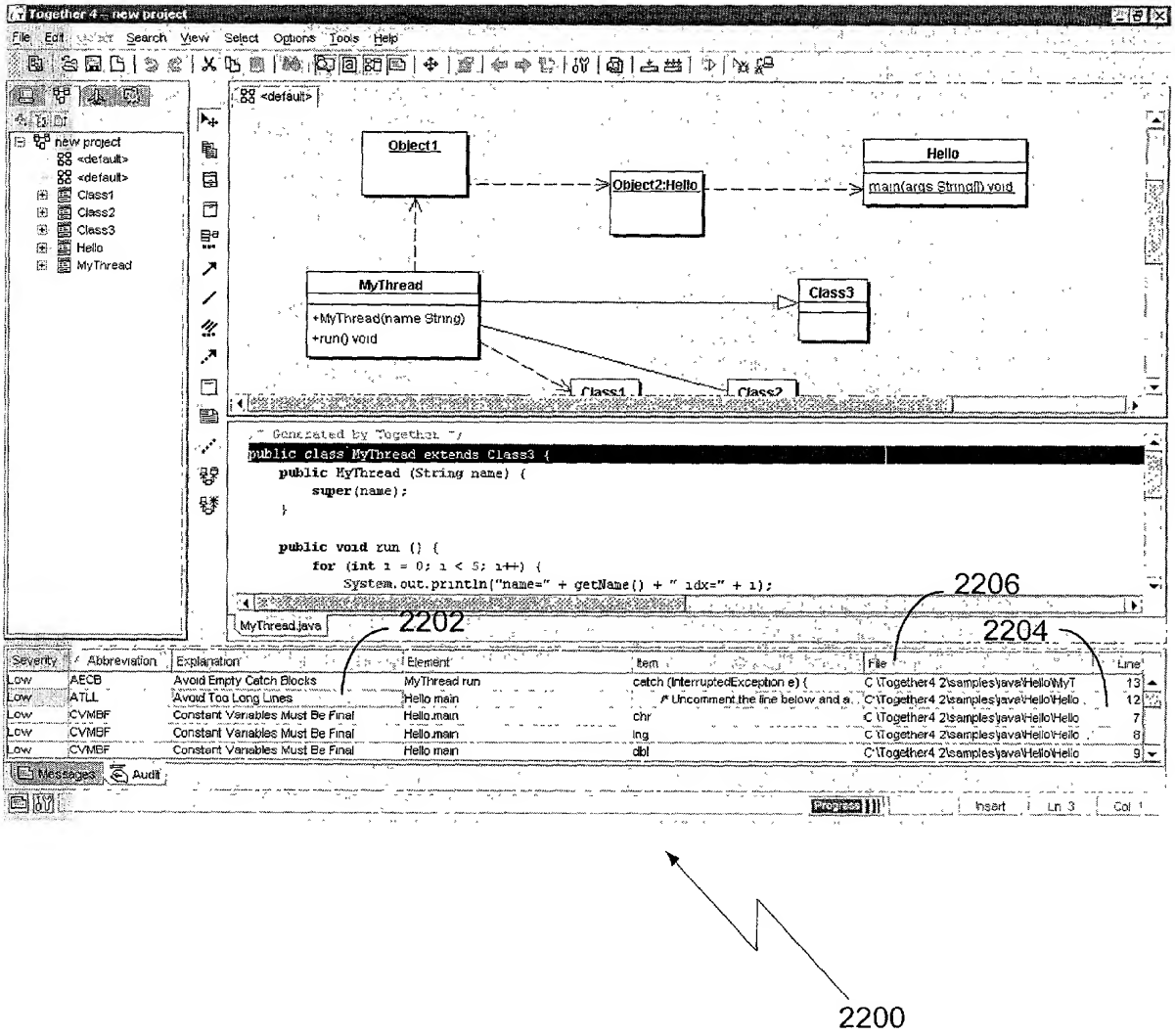
Together 4 – new project
File Edit Search View Select Options Tools Help
new project
<default>
<default>
Class1
Class2
Class3
Hello
MyThread
<default>
Object1
Object2:Hello
Hello
main(args String[]) void
MyThread
+MyThread(name String)
+run() void
Class3
Class1
Class2
public class MyThread extends Class3 {
public MyThread (String name) {
super(name);
}
public void run () {
for (int i = 0; i < 5; i++) {
System.out.println("name=" + getName() + " idx=" + i);
MyThread.java
2206
2202
2204
Severity Abbreviation Explanation Element Item File Line
Low AECB Avoid Empty Catch Blocks MyThread run catch (InterruptedException e) { C:\Together4 2\samples\java\Hello\MyT 13
Low ATLL Avoid Too Long Lines Hello main /* Uncomment the line below and a... C:\Together4 2\samples\java\Hello\Hello 12
Low CVMBF Constant Variables Must Be Final Hello.main chr C:\Together4 2\samples\java\Hello\Hello 7
Low CVMBF Constant Variables Must Be Final Hello.main lng C:\Together4 2\samples\java\Hello\Hello 8
Low CVMBF Constant Variables Must Be Final Hello main dbl C:\Together4 2\samples\java\Hello\Hello 9
Messages
Audit
Progress
Insert
Ln 3
Col
2200

FIG. 22

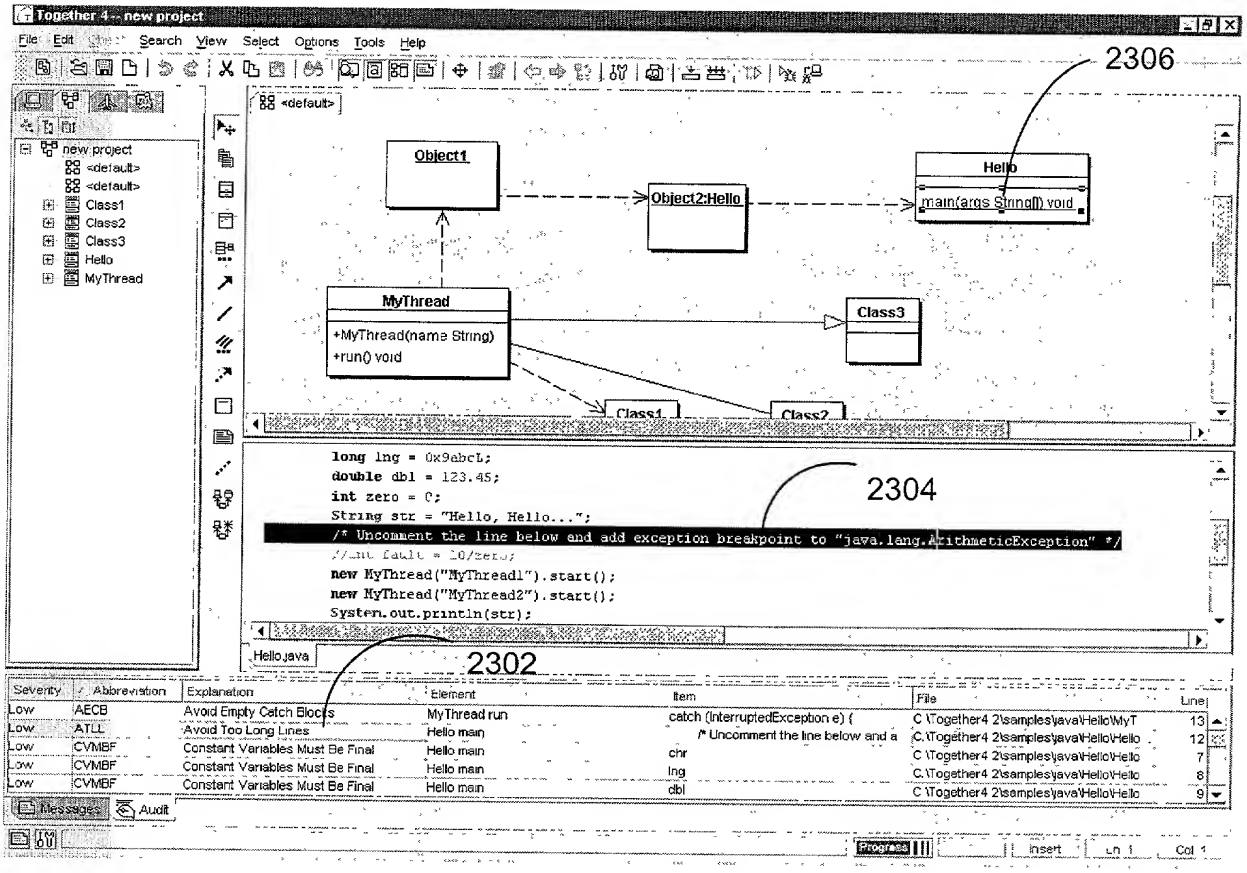
Together 4 - new project
File Edit Search View Select Options Tools Help
2306
new project
<default>
<default>
Class1
Class2
Class3
Hello
MyThread
Object1
Object2:Hello
Hello
main(args String[]) void
MyThread
+MyThread(name String)
+run() void
Class3
Class1
Class2
long lng = 0x9abcL;
double dbl = 123.45;
int zero = 0;
String str = "Hello, Hello...";
/* Uncomment the line below and add exception breakpoint to "java.lang.ArithmeticException" */
//int fault = 10/zero;
new MyThread("MyThread1").start();
new MyThread("MyThread2").start();
System.out.println(str);
2304
Hello.java
2302
Severity Abbreviation Explanation Element Item File Line
Low AECB Avoid Empty Catch Blocks MyThread run catch (InterruptedException e) { C:\Together4 2\samples\java\Hello\MyT 13
Low ATLL Avoid Too Long Lines Hello main /* Uncomment the line below and a C:\Together4 2\samples\java\Hello\Hello 12
Low CVMBF Constant Variables Must Be Final Hello main chr C:\Together4 2\samples\java\Hello\Hello 7
Low CVMBF Constant Variables Must Be Final Hello main lng C:\Together4 2\samples\java\Hello\Hello 8
Low CVMBF Constant Variables Must Be Final Hello main dbl C:\Together4 2\samples\java\Hello\Hello 9
Messages Audit
Progress
Insert
Ln 1
Col 1

FIG. 23

2300